The outstanding Office Action includes a rejection of Claims 166-169 under the second paragraph of 35 U.S.C. § 112, a rejection of Claims 166-169 under 35 U.S.C. § 103(a) as being unpatentable over JP 62-98340 (hereinafter JP '340) and a rejection of Claims 170 and 171 under 35 U.S.C. § 103(a) as being unpatentable over Onishi (U.S. Patent No. 5,459,368, Onishi '368) or Nishio (U.S. Patent No. 4,864,470) in view of JP '340.

The rejection of Claims 166-169 under the second paragraph of 35 U.S.C. § 112 as to the lack of antecedent basis for "the space" of independent Claims 166, 168, and 170 is believed to be now moot in view of the present amendment. The objection to the contact area not being recited to be the only contact area is also believed to be now moot in view of the present amendment. Finally, the objection to the last four lines of these claims is also believed to be now moot in view of the present amendment.

If the Examiner believes that further modifications of the claims are required to overcome other formal matters, it is requested that he contact Applicant's representative at the below-noted telephone number so that mutually-agreeable language can be determined to overcome such formal matters.

SUMMARY

Before turning to the outstanding prior art rejections, it is believed that a brief review of the present invention would be helpful.

In this respect, a first aspect of the present invention (Claims 166-169, for example) relates to a surface acoustic wave (SAW) device that includes a printed circuit board (PCB) that has a PCB wiring pattern a part of which is thicker in terms of having a greater thickness of conductive material than that of the other parts of the wiring pattern, a SAW element, and a sealing member. This sealing member has a sealing portion that only makes contact with a

first board surface over a contact area on the first board surface completely outside of a space formed between the SAW element and the PCB with the sealing member being formed from a hot-melt material having a characteristic preventing the hot-melt material from spreading from the contact area into the space.

In addition, a difference between a thickness of the board wiring pattern and that of the board wiring pad, which is thicker, can be set in a range of from 5 μm to 500 μm, more preferably in a range of from 5 μm to 100 μm.

In the first aspect of the present invention, the thickness of the conductive material can be added to that of the conductive connecting member to advantageously precisely control a desired (or appropriate) volume as to the space portion effectively provided between the SAW element and the PCB.

In the SAW device comprising the SAW element with the sealing member, a bonding strength of the SAW element and the PCB can be provided with more than sufficient strength to insure a reliable connection between the SAW element and the PCB.

The board wiring pattern, part of which is thicker than that of the other part, can be formed by coating the conductive paste using the screen printing method multiple times at least on the part of the wiring pattern and baking them. Still further, the board wiring pattern can be formed by means of a vacuum filming such as a vapor depositing or a sputtering of conductive metal.

Therefore, it is easy to control the thickness of conductive material in the board wiring pattern. The present invention has an industrial advantage.

Furthermore, even though a dam or a frame-shaped member is not used, this sealing member will not spread or otherwise intrude into the space portion between the SAW element and the PCB. Accordingly, a propagation path for a surface acoustic wave is

ensured in a transducer portion of the SAW element and the construction of the device is simplified because no process for forming a dam or the like is required resulting in a reduction of the number of fabrication process steps and fabrication cost.

In a second aspect of the present invention, as in Claim 168, for example, a SAW device is provided that comprises a PCB having a first region and a second region that is thicker than the first region, and the above-mentioned sealing member. The thickness of this second region also contributes to determining the spacing between the SAW element and the PCB and a desired volume or space can be formed between the SAW element and the PCB. The difference of the thickness should be essentially in the range of from 5 μm to 500 μm, more preferably in the range of from 5 μm to 100 μm.

In this second aspect of the present invention, the second region that is thicker than the first region can be formed by adding a green sheet to a ceramic, a glass coated ceramic or the like, performing as the PCB, or by grinding down the first region of the PCB. Therefore, it is easy to control the difference of the thickness between the first region and the second region of the PCB to provide a clear advantage.

The claimed sealing member is again structured to prevent any sealing material being present in the space and provides the benefits noted above.

A third aspect of the present invention relates to a SAW device including a conductive connecting member and a sealing member. The appropriate volume of the space between the SAW element and the PCB is very precisely determined by a stacked arrangement of a particular number of bumps being used as the conductive connecting member to provide desired spacing between a wiring pattern of the PCB and a wiring connection portion of the SAW element. This sealing member has a sealing portion that only makes contact with a first board surface over a contact area on the first board surface

completely outside of a space formed between the SAW element and the PCB with the sealing member being formed from a hot-melt material having a characteristic preventing the hot-melt material from spreading from the contact area into the space.

By varying a width of a conductive thin wire when a ball bump is formed, the dimension of the ball bump can be controlled and by controlling the dimension of one of the stacked ball bumps, a desired and uniform volume of the space can be secured.

Further, even though a dam or a frame-shaped member is not used, the sealing member does not spread or intrude into the space portion between the SAW element and the PCB to ensure providing a propagation path for a surface acoustic wave while providing the benefits noted above. Thus, the construction of the SAW device is simplified as the forming of a dam or a frame-shaped member is not required to reduce costs and steps in the fabricating process.

REJECTION TRAVERSALS

Turning to the rejection of Claims 166-169 as being unpatentable over JP '340, it is first noted that JP '340 discloses a SAW device that has a lead frame with a projection. In this SAW device, a connecting pad of the SAW element is connected to the projection of the lead frame. Page 2 of the outstanding Office Action attempts to create a teaching that the element labeled as 16 in JP '340 is intended to act with element 17 thereof as same type of "sealing member" with reference to "the SAW being somehow "seated" thereby and then to suggest that these two elements together will provide "an internal space that is defined by the volume not filled by #16, #17; thus it does not intrude into this space." The functional limitation is also ignored in violation of established law that all limitations, even functional ones, must be considered.

Moreover, the outstanding Office Action attempts to characterize these specific limitation as somehow being "within the skill expected of the routineer" (at the middle of page 3). As noted below, however, examiners must supply evidence, not unsupported assertions.

However, it is clear that element 16 of Figs. 2 and 3 of JP '340 is made of SOUND ABSORBING MATERIAL and that the attempt by the PTO to label it as having any sealing or seating function is not proper. In this regard, absent a clear teaching in JP '340 that SOUND ABSORBING MATERIAL 16 is to perform any sealing or seating function, the PTO can only be making the type of unwanted assumption based upon conjecture that the precedent of the PTO reviewing court prohibits. See In re Piasecki, 223 USPQ 785, 788 (Fed. Cir. 1984) as follows:

> The Supreme Court in *Graham v. John Deere Co.*, 383 U.S. 1,148 USPQ 459 (1966), focused on the procedural and evidentiary processes in reaching a conclusion under section 103. As adapted to ex parte procedure, Graham is interpreted as continuing to place the "burden of proof on the Patent Office which requires it to produce the factual basis for its rejection of an application under sections 102 and 103". *In re Warner*, 379 F.2d 1011, 1016, 154 USPQ 173, 177 (CCPA 1967).

This Warner decision (at 154 USPQ 178) is further crystal clear that "speculation" or "unfounded assumption" are not substitutes for this required "factual basis" that must be shown.

In this regard, further note the REQUIREMENT of the PTO reviewing court that the PTO must produce concrete evidence in In re Zurko, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001) quoted in the last response in part as follows:

> With respect to core factual findings and determination of patentability, however, the [PTO] cannot simply reach conclusions based on its own understanding or expertise -- or on its assessment of what would be basic knowledge or common sense. Rather, the [PTO] must point to some concrete evidence in the record in support of these findings. [Emphasis added]

Also note In re Lee, 61 USPQ2d 1430, 1433 (Fed. Cir. 2002) as follows:

> The factual inquiry whether to combine references must be thorough and searching. It must be faced on objective evidence of record. This precedent has been reinforced in myriad decisions, and cannot be dispensed with.

Clearly, the PTO assumption that #16 and #17 can be said to meet the language of independent Claims 166 and 168 that require a "sealing member" and not a SOUND ABSORBING member adhered by an adhering layer is unreasonable. See In re Cortright 49 USPQ 2d 1464, 1467 (Fed. Cir. 1999) ("Although the PTO must give claims their broadest reasonable interpretation, this interpretation must be consistent with the one those skilled in the art would reach.").

To even more clearly highlight the unreasonableness of the PTO position, the previously-claimed nature of the sealing member has been made unmistakable as to "the sealing member only making contact with the first board surface over a contact area on the first board surface completely outside of a space formed between the first board surface and the first element surface with the sealing member being formed from a hot-melt material having a characteristic preventing the hot-melt material from spreading from the contact area into the space."

With further regard to independent Claim 168, the SAW device of JP '340 does not include the claimed PCB having a first region and a second region of a material which is of a greater thickness in the second region than in the first region. The conductors on a printed circuit board cannot be reasonably read as part of the board itself given the understanding and usage of these terms in the art and the well established precedent that the PTO cannot completely ignore the understanding that the artisan would have of words used in the claims read in light of the specification and to ascribe a completely different meaning thereto. See again the above-noted Cortright decision.

Moreover, in the SAW device of JP '340, an appropriate volume of the space portion cannot be secured effectively between the SAW element and the insulating substrate.

Further, the SAW device of JP '340 does not include the PCB having a first region and a second region which is of a greater thickness than the first region. In addition, the SAW device does not include the sealing member claimed in the present invention.

JP '340 does not disclose or suggest any of the features and the resultant advantageous effects represented in the present invention.

Turning to the subject matter of dependent Claims 167 and 169, it is first noted that these claims are respectively dependent on Claims 166 and 168 and should be considered allowable for the same reasons that each of these present claims are clearly allowable. In addition, each of these dependent claims further add the feature of limiting the difference in claimed thickness that has been improperly dismissed.

The rejection of Claims 170 and 171 is similarly traversed. In addition, it is noted that Nishio discloses a mounting device for a SAW device in which its functional surface faces a base plate and a space is formed there between, Nishio neither teaches nor suggests that the conductive connecting member is made up of a plurality of bumps that are stacked together to accurately obtain a desired spacing between a PCB and a SAW element. In addition, the SAW device of Nishio does not include the sealing member as claimed and corrects for none of the above-noted deficiencies of JP '340 in this regard.

Onishi '368 discloses a SAW device comprising multilayer substrate, a SAW element, metallic bumps, which are transfer-coated with a conductive resin, on electrode pads and an insulating resin around the SAW element.

However, the SAW device of Onishi et al. does not include the conductive connecting member made up of a plurality of bumps that are stacked together to obtain a desired spacing

between a PCB and a SAW element. In addition, the SAW device of Onishi et al. does not include the sealing member claimed in the present invention.

Moreover, the SAW device of JP '340 is not taught or suggested to include a conductive connecting member composed of stacked bumps. The multiple layers (a sound absorbing material #16 and an adhesive material #17) of JP '340 are clearly different from the claimed stacked bumps and are not concerned with achieving the benefits only disclosed in this application. Similarly, elements 14a, 15a, shown by JP '340 are clearly different from the claimed stacked bumps and are not concerned with achieving the benefits only disclosed in this application. Thus, JP '340 includes no teaching or suggestion as to any precise control of the thickness of multiple layers of #16 and #17 or of contacts 14a, 15a. Accordingly, an appropriate volume of the space portion of concern to Applicants cannot be secured effectively between the SAW element and the PCB of JP '340 following the teachings demonstrated to be prior art teachings.

The provision of multiple bumps in the claimed stacked arrangement is clearly disclosed as one advantageous way to provide desired spacing between the PCB and the SAW element without the need or expense of controlling the thickness of the PCB or other conductive material. See the specification at page 319, lines 20-26, for example. Once again, a claim limitation cannot be ignored based on the mere theory that the bumps will melt.

Furthermore, and as also noted above, layer 16 and 17 of JP '340 serve different functions from the bumps of Nishio. These layers are, thus, not analogous to a single bump, much less to stacked bumps all serving the same function. The attempt to draw a generalized teaching of providing multiple layers instead of one layer of an element from the disclosure of two different layers (#16 and #17) performing two different functions in JP '340 is clearly

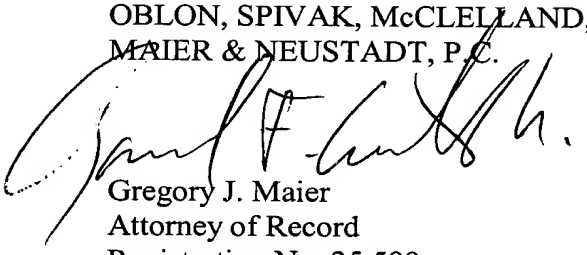
mistaken. The attempt here to abstractly view layer 16 and 17 totally out of their disclosed context violates the directives of the court in In re Kotzab, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000) ("[reference] statements cannot be viewed in the abstract. Rather, they must be considered in the context of the teaching of the entire reference.").

Finally, the top of page 4 again attempts to pass off the unsupported subjective belief that ultrasonic bonding or reflow soldering would cause the claimed stacked bumps to "lose their identity in the finished product" as if this unsupported subjective belief were a proven fact in clear violation of the recent Lee decision cited above. See Lee at 61 USPQ2d 1434 and its emphasis there that questions material to patentability cannot "be resolved on subjective belief and unknown authority." Again, the PTO must carry its burden of proof as to a factual basis set forth by In re Piasecki, supra, without substituting assumption and conjecture for demonstrations of actual facts.

As no further issues are believed to be outstanding in the present application, it is believed that the present application is in condition for formal allowance and an early and favorable action to that effect is, therefore, respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



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IN THE CLAIMS

Please amend the claims as follows:

--166. (Thrice Amended) A surface acoustic wave device, comprising:

a printed circuit board including a first board surface and a second board surface, the first board surface having a board wiring pattern, a part of the board wiring pattern, that is a board wiring pad, being thicker in thickness of conductive material than that of the other part;

a surface acoustic wave element possessing a first element surface and a second element surface, the first element surface including a transducer portion, a element wiring pad, and a surface acoustic wave absorbing member formed outside of the element wiring pad, and the first element surface being disposed in an opposite relation with respect to the first board surface;

a conductive connecting member disposed between the board wiring pad and the element wiring pad, and

a sealing member having a sealing portion, the sealing member only making contact with the first board surface over a contact area on the first board surface completely outside of [the] a space formed between the first board surface and the first element surface with the sealing member being formed from a hot-melt material having a characteristic preventing the hot-melt material from spreading from the contact area into the space.

168. (Thrice Amended) A surface acoustic wave device, comprising:

a printed circuit board of a material possessing a first region and a second region which is thicker than the first region, the second region including a board wiring pad thereon;

a surface acoustic wave element possessing a first element surface and a second element surface, the first element surface including a transducer portion, a element wiring pad and a surface acoustic wave absorbing member, and being disposed with a face-down so that the surface acoustic wave absorbing member is disposed in an opposite relation with respect to the first region of the printed circuit board;

a conductive connecting member disposed between the board wiring pad and the element wiring pad, and

a sealing member having a sealing portion, the sealing member only making contact with the first board surface over a contact area on the first board surface completely outside of [the] a space formed between the first board surface and the first element surface with the sealing member being formed from a hot-melt material having a characteristic preventing the hot-melt material from spreading from the contact area into the space.

170. (Thrice Amended) A surface acoustic wave device, comprising:

a printed circuit board including a first board surface and a second board surface, the first board surface having a board wiring pattern;

a surface acoustic wave element possessing a first element surface and a second element surface, the first element surface including a transducer portion, a element wiring pad and a surface acoustic wave absorbing member, and the first element surface being disposed in an opposite relation with respect to the first board surface;

a conductive connecting member disposed between the board wiring pattern and the element wiring pad, the conductive connecting member being composed of a plurality of

bumps stacked according to a spacing between the board wiring pattern and the element wiring pad, and

a sealing member having a sealing portion, the sealing member only making contact with the first board surface over a contact area on the first board surface completely outside of [the] a space formed between the first board surface and the first element surface with the sealing member being formed from a hot-melt material having a characteristic preventing the hot-melt material from spreading from the contact area into the space.--